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EFFECT OF ECONOMIC ENVIRONMENT ON ARAB INDUSTRIALISATION

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ABSTRACT

This paper uses multiple discriminant analysis to test for similarity in patterns of industrial development in the Middle East. The study divides the Arab world into three groups: oil economies, middle-income countries and low-income countries. It was found that factors such as absorption/gross domestic product, imports/absorption, domestic linkages and size have been instrumental in moulding the industrial structures of the region.

Introduction

Classification schemes have been used numerous times to produce generalizations capable of expanding our knowledge of events in ways not possible through simple examination of individual entities. The most useful taxonomies in the Arab world originate from the work of Yusif Sayigh[1].

Sayigh's work has focused mostly on the underlying determinants of economic and social development in the region. In doing so, he was able to show a number of factors common to groups of Middle Eastern countries, and in the process greatly enhanced our understanding of the underlying mechanisms leading to development in that part of the world.

More recently, and focused on a much narrower topic, researchers have attempted to identify through various country groupings patterns of industrial development.[2] The presumption is that each country grouping delineates an environment unique to the set of member countries. Furthermore, it is assumed that this environment affects on industrial development in a predictable manner to produce a characteristic industrial structure over time.

The purpose of this paper is to address the issue of industrialization in the Middle East from the perspective of common environmental conditioning. Are there similar patterns of industrial development in the Middle East, and if so what are they?

What factors have been responsible for these configurations and are they likely to continue in the future?

Classification Schemes

As one might imagine, most attempts at classification begin with oil or its lack and draw implications for the conversion of oil revenues into investment in the industrial sector. For example El-Imam (1986) has developed a four country grouping focused on the extent of oil resources:

1. All countries presently members of OPEC. The oil resources of these countries will continue, for several years, to exceed their own needs. These countries may be further divided into two sub-groups.
   a Algeria and Iraq, which have a large hydrocarbon sector, but at the same time possess other natural resources, as well as sizeable human resources.
   b Those countries whose major resources is oil but which lack other natural resources. Most of its members also suffer from scarcity of manpower. They include Libya and the four Gulf states of Kuwait, Qatar, Saudi Arabia and the United Arab Emirates (UAE).

1 See for example Yusif Sayigh (1978).
2 See for example Robert E. Looney and Craig Knouse (1987) and Robert E. Looney (1987).

2. Countries with greater balance between oil resources and needs, which are expected to run out of oil resources in the near future. They include Oman, and the other members of the Arab group within OPEC (OAPEC), Bahrain, Egypt, Syria and Tunisia.
3. Countries which may have limited oil resources but are essentially importers of oil and its products.
   a A middle income group comprising Jordan, Lebanon and Morocco.
   b Less developed countries including Djibouti, Somalia, Sudan and the two Yemens.

Implicit in this typology of countries is the presumption that the development pattern and in particular the structure of industry will be conditioned by developments in the oil sector. The linkage from oil to industry was made more explicit in 1980 in the *Joint Arab Economic Report* · Arab Monetary Fund (1980), which divided the Arab countries into four groups.

The first group comprised the Arab OPEC members, distinguishing between those which are relatively densely populated and considered to have a diversified economic base and a large absorptive capacity for investment (Algeria and Iraq) and the others (Kuwait, Libya, Qatar, Saudi Arabia and the UAE).

The third group contained the remaining countries of Bahrain, Egypt, Jordan, Lebanon, Morocco, Oman, Syria and Tunisia; these were officially defined as developing and sometimes divided between the five that were self sufficient in oil and the three that were not.

In terms of the link between oil and industrial structure, the *Joint Arab Economic Report* made a convincing argument for four major country groupings (as of the early 1980s):

1. The first comprised those countries possessing a diversified manufacturing sector - Algeria, Egypt, Iraq, Lebanon, Morocco, Syria and Tunisia.
2. Bahrain, kuwait, Qatar and Saudi Arabia were grouped together as countries with large-scale predominantly oil and gas industries.
3. Sudan, Libya and the People's Democratic Republic of Yemen made up the third group of countries whose industrial structure fell somewhere between the first two groupings' criteria.
4. The remaining countries were classified as displaying industrial sectors of limited diversity and size.

The problems of disparity within the GCC, especially with relation to the size of the Saudi economy *vis a vis* the others was recognized by the Joint Report, but it went on to argue that the individual GCC economies have all grown relative to other Arab economies since the early 1970s. Furthermore, those states starting with a very small industrial sector (Qatar, the UAE, and particularly Oman) experienced the greatest expansions in manufacturing output. In other words common forces in the GCC appear to be pulling towards a convergence of industrial structures.

The grouping of Libya with Algeria and Iraq brings together the three largest Arab economies after Saudi Arabia, and while Libya's absorptive capacity is arguably smaller than the other two countries, it has actively and successfully been pursuing a broadly similar industrial strategy—socialist-inspired, funded by oil revenues and leaning towards heavy industry. [3]

The third group of six middle income countries seems particularly fitting, with these states occupying the top six places in the Arab world in terms of the share of manufacturing in the Gross Domestic Product.

There is no great homogeneity in the manufacturing structure, performance or prospects of the fourth group of low income Arab countries, but they all strive against a general lack of financial resources which in a period characterised by high capital formation has been responsible for the widening of the gap between these and the other Arab economies.

A certain consistency is also found within the differing output structures displayed by the manufacturing sectors of countries in these groupings. The GCC states, for instance, all emphasize chemical products and building materials while tending to ignore more labour-intensive industries in the agro-industry and clothing sectors.

The middle income states' manufacturing structure is much more evenly spread across the various manufacturing divisions.

In sum, the country groupings examined above provide valuable insights into both contrasting patterns of industrial development in the Arab World, and the processes through which these structures were created. In large part, however, these groupings are anecdotal and subjective—based principally on a "feel" for the region, rather than on quantitative analysis. The purpose of the following section is to see if and to what extent the industrial patters alluded to above, can be confirmed through statistical methods.

3 See Arab Banking Corporation (1986)

Methodology

The principal method of analysis was discriminant analysis. The data set used for the analysis consisted principally of the national income accounts of the twenty members[4] of the Arab Monetary fund.[5] The variables selected for analysis represented different facets of manufacturing activity:

a manufacturing value added/absorption .
b manufacturing value added/value added in services (housing, government services, other services).
c manufacturing value added/value added in distributional activities (commerce-restaurants-hotels, transportation-communication-storage and finance-insurance-banking).
d. manufacturing/non-oil GDP
e. manufacturing/commodities (agriculture, utilities, and construction).

As noted above, the analytical approach capable of identifying whether unique country groupings can be formed on the basis of the five measures of manufacturing activity is multiple discriminant analysis (MDA).[6] Numerous applications of MDA to identification problems based on profile data have been made.

In past research, MDA has been used primarily as a method of studying profile relationships among several groups and for classifying individual entities into groups.[7]

This paper, however, makes use of a specific aspect of MDA which is frequently ignored: that is, its ability to provide the best statistical basis (in a least squares sense) for computing estimates of the specific probabilities of a Arab country placed on the basis of its industrial structure in a pre-specified country grouping. As a starting point, and based largely on the studies surveyed above, the twenty Arab countries were classified into one of three groups:

1. **Oil Economies:** UAE, Saudi Arabia, Oman, Qatar, Kuwait, and Libya.
2. **Middle Income Countries:** Iraq, Jordan, Egypt, Algeria, Tunisia, Morocco, Syria and Lebanon.
3. **Low Income Countries:** PDR Yemen, Yemen Arab Republic, Sudan, Somalia, and Mauritania.

The results of the discriminant analysis programme produced on the basis of industrial structure a probability of placement in each of the three groups.

As a second step, a step wise discriminant analysis was used to determine the statistical significance (the contribution of the variable to differentiating countries) as given by the F Statistic of each of the five measures of industrial activity.

Results

The discriminant analysis exercises produced (Tables 1-3) a number of interesting patterns:

1. At the beginning of the period (1975) there does not appear to be a strong delineation of industrial structures among the Arab countries (Table 1). This is evidenced by the relatively low probabilities of correct placement for Group I, II and III countries (68.41, 39.00 and 66.50 respectively).
2. As a corollary, none of the measures of industrial structure were statistically significant (based on values for the F statistic).
3. The best results were obtained for the oil producers with no misclassifications, followed by low income group.

By 1980 (see Table 2):

1. Delineation improved to the point that only two countries were misclassified: Saudi Arabia, and Tunisia.
2. In addition, several of the measures of manufacturing activity, manufacturing/services and manufacturing/non-oil GDP, were now statistically significant in classifying countries into their respective groupings.
3. An examination of the means of the discriminating variables indicates that several major similarities exist between Groups I and III: (a) both groups have relatively low ratios of manufacturing to services, distribution, and absorption. In large part this reflects the underdevelopment of manufacturing in Group III countries and overdevelopment of service and distribution in Group I countries.

By 1985 (see Table 3):

1. The Delineation between the three country groupings was much clearer, with oil countries possessing an average probability of correct placement of 92.67.
2. The only misclassified country was Iraq (classified as oil country).
3. Three measures of manufacturing activity were statistically significant: manufacturing/non-oil GDP, manufacturing/services and manufacturing/distribution.
4. As in 1980, Groups I and III have relatively low

4 Because of missing values for some variables Syria, Lebanon, Iraq were often not included in the final results Mauritania was also missing in several of the final results
5 See Arab Monetary Fund (1987)
6 The programme used for the analysis below was from the Statistical Analysis System. See Sas User's Guide (1985).
7 See for example Klett (1972) and Jones (1980), pp. 74-80.

Table 1
Arab Countries: Profiles of Industrial Structure, 1975
Probability of Correct Placement

Country		Five Variables Group I	Group II	Group III
Oil Economies—Group I				
UAE		48.24	35.94	15.82
Bahrain		51.27	48.03	0.70
Saudi Arabia		67.43	31.93	0.64
Oman		84.15	13.85	2.00
Qatar		69.68	26.65	3.67
Kuwait		75.36	23.99	0.64
Libya		82.72	15.68	1.59
Average		**68.41**	**28.01**	**3.58**
Middle Income—Group II				
Jordan		37.73	50.93	11.34
Egypt		2.23	43.85	53.92
Algeria		2.05	36.51	61.44
Tunisia		46.93	42.01	11.05
Morocco		77.78	21.72	0.50
Average		**33.34**	**39.00**	**27.65**
Low Income—Group III				
PDR Yemen		32.11	51.53	16.36
Yemen Arab Republic		4.98	29.72	65.30
Sudan		0.22	10.00	89.78
Somalia		0.12	5.34	94.54
Average		**9.36**	**24.15**	**66.50**
			Group Means	
Discriminating Variables	**F Statistic**			
Manufacturing/absorption	0.61	8.98	11.00	5.68
Manufacturing/services	0.70	46.48	68.91	57.53
Manufacturing/distribution	0.67	42.43	51.12	28.59
Manufacturing/non-oil GDP	0.90	12.70	14.58	7.42
Manufacturing/non-oil comm.	1.19	33.36	34.71	15.32

ratios of manufacturing to services, distribution and non/oil GDP.

5. Using only the three statistically significant variables, in general it is apparent that three groups of Arab countries have, in recent years, had significantly different patterns of industrial development. Furthermore, these patterns become more apparent over time, as each group of countries grows along a somewhat different path of development.

Put differently, it appears that with the 1973/74 oil price shock, Arab countries possessed varied industrial structures, each of which had evolved in its own rather unique setting. While broad groupings of countries possessing similar industrial structures were apparent at this time, differences between individual countries were great enough to blur these broad distinctions, making them of somewhat limited use in our understanding of the process of Arab industrialization.

The question at this point is whether this differentiation process can be explained as the result of environmental factors. Were the macro-economic environments of our three groups of countries significantly different, and if so, how did they impact on industrial development? Put differently can we profile these environments with the same degree of precision obtained for industrial development, and if so what are the links between economic environment and the overall pattern of industrial development?

Table 2
Arab Countries: Profiles of Industrial Structure, 1980
Probability of Correct Placement

Country	Group I	Group II	Group III
Oil Economies—Group I			
UAE	61.76	34.26	3.99
Bahrain	73.93	25.71	0.37
Saudi Arabia	30.65	66.79	2.57
Oman	90.37	1.19	8.44
Qatar	95.70	2.02	2.28
Kuwait	93.01	6.16	0.84
Libya	78.56	6.65	14.79
Average	**74.85**	**20.40**	**4.75**
Middle Income—Group II			
Iraq	42.30	52.36	5.33
Jordan	37.56	39.76	22.68
Egypt	2.03	84.49	13.48
Algeria	2.17	87.45	10.39
Tunisia	4.91	43.69	51.40
Morocco	8.83	90.53	0.64
Average	**23.79**	**66.38**	**17.32**
Low Income—Group III			
PDR Yemen	10.61	21.83	67.56
Yemen AR	28.67	17.94	53.39
Sudan	25.12	17.86	57.02
Somalia	0.01	1.27	98.39
Average	**16.10**	**14.73**	**69.09**

		Group Means		
Discriminating Variables	**F Statistic**			
Manufacturing/absorption	0.02	7.96	10.60	24.99
Manufacturing/services	3.15	42.76	69.80	48.43
Manufacturing/distribution	2.63	32.37	48.91	30.12
Manufacturing/non-oil GDP	3.43	11.34	14.29	7.37
Manufacturing/non-oil commodities	0.86	33.03	34.44	18.45

In his study of industrialization Al-Moajil (1986, p. 9-30) grouped all the Arab Gulf states - Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates—together and argued that they represented a homogeneous environment. The above analysis, and in particular the results presented in Table 3, indicate that there is considerable justification for this grouping.

Al-Moajil notes that from the mid-1970s onwards, an economic cycle developed in which oil revenues allowed ever increasing government spending on current account as well as on development projects. Government spending fuelled increased economic activity, which in turn attracted or demanded more foreign manpower ranging from unskilled construction workers to top level management executives and engineers. The influx of labour created more demand for houses, hospitals and schools and so more oil revenues were required to fund more infrastructural development.

According to Al-Moajil, two perspectives are important in understanding the Gulf States industrialization efforts:

1. Despite efforts in each of these states to diversify sources of income though industrialization, the constant increase in the value of oil exports up to 1982 meant a continuation of the dominance of the oil sector while the impact of the small but important contribution of the infant industrial sector was diminished to the point of being ignored.

Table 3
Arab Countries: Profiles of Industrial Structure, 1985
Probability of Correct Placement

Country	Five Variables			Three Variables		
	Group I	Group II	Group III	Group I	Group II	Group III
Oil Economies—Group I						
UAE	91.64	8.36	0.01	86.96	13.02	0.02
Bahrain	99.93	0.07	0.00	99.72	0.28	0.00
Saudi Arabia	62.40	36.54	1.06	80.51	18.84	0.65
Oman	99.87	0.07	0.05	99.54	0.12	0.34
Qatar	99.89	0.11	0.00	99.12	0.87	0.01
Kuwait	99.11	0.87	0.02	99.84	0.16	0.00
Libya	95.85	2.78	1.37	88.31	4.70	7.00
Average	**92.67**	**6.97**	**0.36**	**93.43**	**5.43**	**1.15**
Middle Income—Group II						
Iraq	69.60	29.61	0.79	73.79	24.67	1.55
Jordan	14.67	70.58	14.75	38.62	56.64	4.74
Egypt	0.22	93.76	6.03	0.41	95.43	4.17
Algeria	0.00	53.73	46.23	0.01	71.02	28.97
Tunisia	0.24	82.70	0.24	0.30	87.76	11.95
Morocco	0.39	99.45	0.16	0.15	99.57	0.27
Average	**14.19**	**71.64**	**11.37**	**16.18**	**62.16**	**7.38**
Low Income—Group III						
PDR Yemen	0.25	43.23	56.52	4.56	72.66	22.78
Yemen AR	0.49	10.58	88.93	0.34	5.99	93.68
Sudan	0.00	1.75	98.25	0.00	0.96	97.86
Somalia	0.00	1.35	98.64	0.00	1.41	98.54
Average	**0.19**	**14.23**	**85.59**	**1.23**	**20.26**	**78.22**

Discriminating Variables	F Statistic	Group Means I	II	III
Manufacturing/absorption	0.65	8.49	11.01	6.15
Manufacturing/services	5.27	37.22	66.55	58.34
Manufacturing/distribution	4.99	34.84	48.82	31.00
Manufacturing/non-oil GDP	6.81	11.68	14.16	8.42
Manufacturing/non-oil commodities	0.18	37.70	34.72	19.90

2. The increase in population and per capita income together with changing patterns of consumption led to rapid development of local markets. The private sector played a fundamental role in the efforts to benefit from new market situations by establishing small scale manufacturing units to produce commodities for the local consumer. These private sector efforts depended heavily on state support in the form of subsides and incentives of various kinds, as well as the provision by the state of fully equipped and serviced industrial sites for which all development costs were borne by the state.

Al-Moajil's comments are suggestive of several sets of variables that might have created the individual environments in which Arab industrialization has taken place in recent years:

1. **Size Variables:** Has the size of the local market constrained industrial development in the Arab world, and in particular in the Arab Gulf states? To test this hypothesis the relative share (of Arab world total) of each country's population and GDP were included in the analysis.
2. **Government Expenditures:** Has the expansion of governmental spending aided (through demand creation) or hurt (through the preemption of scarce resources) the region's industrial efforts? Two types of public good expenditures, civilian and military, were included to test for this factor.
3. **Domestic Linkages:** Has diversification into manufacturing been stimulated by domestic demand stemming from the growth of complementary sectors, or has demand been directed more towards imports?

Table 4
Arab Countries: Industrial Environments, 1975
Probability of Correct Placement

Country	Seven Variables Group I	Group II	Group III	Three Variables Group I	Group II	Group III
Oil Economies—Group I						
UAE	100.00	0.00	0.00	100.00	0.00	0.00
Bahrain	100.00	0.00	0.00	100.00	0.00	0.00
Saudi Arabia	100.00	0.00	0.00	100.00	0.00	0.00
Oman	100.00	0.00	0.00	100.00	0.00	0.00
Qatar	100.00	0.00	0.00	100.00	0.00	0.00
Kuwait	na	na	na	100.00	0.00	0.00
Libya	99.94	0.06	0.00	99.98	0.02	0.00
Average	**99.00**	**0.01**	**0.00**	**99.99**	**0.01**	**0.00**
Middle Income—Group II						
Jordan	0.00	31.84	68.16	0.00	41.40	58.60
Egypt	0.00	98.89	1.11	0.00	44.04	55.96
Algeria	0.00	98.32	1.68	0.00	84.84	15.16
Tunisia	0.00	23.01	76.99	0.00	63.74	36.26
Morocco	0.00	74.74	25.26	0.00	56.28	43.72
Average	**0.00**	**65.36**	**34.64**	**0.00**	**58.06**	**33.20**
Low Income—Group III						
PDR Yemen	na	na	na	0.00	25.54	74.46
Yemen AR	0.00	1.02	98.98	0.00	28.83	71.17
Sudan	0.00	31.89	68.11	0.00	34.49	65.51
Somalia	0.00	1.38	98.62	0.00	36.41	63.59
Mauritania	0.00	18.00	82.00	0.00	72.22	22.78
Average	**0.00**	**13.07**	**86.93**	**0.00**	**39.50**	**59.50**

Discriminating Variables	F Statistic	Group Means I	II	III
Relative share of Arab world population	2.16	1.35	11.32	3.88
Relative share of Arab world GDP	0.86	7.50	5.54	0.09
Government civilian expenditure/absorption	0.20	0.57	0.23	0.19
Government military expenditure/absorption	0.13	0.17	0.10	0.04
Absorption/GDP	15.32	0.63	1.20	1.29
Imports/absorption	4.47	0.66	0.39	0.35
Non-oil GDP/absorption	6.96	0.66	0.75	0.75

Three measures of the composition of demand were tested: (a) non-oil GDP/absorption, (b) imports/absorption, and (c) absorption/gross domestic product.

As with the exercises above, the discriminant analysis was undertaken on two levels. In the first instance, all six variables were used and the probabilities of correct placement recorded. In the second case, only the three variables of highest statistical significance were included in the analysis. The second set of runs, therefore, pinpoint the variables that were of crucial importance in placing countries in their respective groupings.

Again, several interesting patterns (Tables 4-6) emerged:

1. At the beginning (Table 4) of the period under consideration (1975), Group I countries were classified with nearly a 100 per cent chance of correct placement.
2. The variables most relevant for this grouping were: (a) absorption/GDP, (b) non-oil GDP/Absorption, and (c) imports absorption.
3. Because of their large trade surpluses this group of countries had a significantly lower ratio of absorption to GDP, While at the same time their ratio of imports to absorption was somewhat higher than that experienced by the other two groups. Finally, the dominance of oil in these economies manifests itself in the relatively low ration of non-oil GDP to absorption.

Table 5
Arab Countries: Industrial Environments, 1980
Probability of Correct Placement

Country	Seven Variables			Three Variables		
	Group I	Group II	Group III	Group I	Group II	Group III
Oil Economies—Group I						
UAE	100.00	0.00	0.00	99.94	0.06	0.00
Bahrain	100.00	0.00	0.00	100.00	0.00	0.00
Saudi Arabia	99.84	0.16	0.00	93.66	6.31	0.03
Oman	99.98	0.02	0.00	95.58	4.35	0.07
Qatar	99.61	0.39	0.00	99.99	0.01	0.00
Kuwait	100.00	0.00	0.00	99.97	0.03	0.00
Libya	99.96	0.04	0.00	96.49	3.47	0.04
Average	**99.91**	**0.09**	**0.00**	**97.95**	**1.18**	**0.02**
Middle Income—Group II						
Iraq	15.57	84.37	0.06	75.36	24.49	0.15
Jordan	0.00	35.41	64.59	0.02	36.57	63.41
Egypt	0.00	99.53	0.47	0.00	98.12	1.87
Algeria	0.19	97.12	2.70	0.14	90.60	9.27
Tunisia	0.02	65.37	34.61	1.78	82.03	16.19
Morocco	0.00	59.25	40.75	0.00	72.16	27.84
Syria	na	na	na	0.02	48.48	51.51
Lebanon	na	na	na	0.18	54.10	45.72
Average	**2.63**	**73.51**	**23.86**	**9.69**	**63.32**	**27.00**
Low Income—Group III						
PDR Yemen	na	na	na	0.00	1.24	98.76
Yemen AR	0.00	1.02	98.91	0.00	4.64	95.36
Sudan	0.00	31.89	68.11	0.00	65.80	34.20
Somalia	0.00	1.38	98.62	0.01	24.77	75.23
Mauritania	0.00	18.00	82.00	0.04	35.91	64.05
Average	**0.00**	**13.07**	**86.93**	**0.01**	**33.09**	**73.52**

Discriminating Variables	F Statistic	Group Means I	II	III
Relative share of Arab world population	2.77	1.42	10.53	3.62
Relative share of Arab world GDP	0.36	7.93	6.15	0.08
Government civilian expenditure/absorption	0.62	0.41	0.36	0.18
Government military expenditure/absorption	0.22	0.14	0.11	0.05
Absorption/GGDP	15.00	0.63	1.06	1.31
Imports/absorption	4.60	0.63	0.43	0.34
Non-oil GDP/absorption	1.24	0.65	0.73	0.75

4. Interestingly enough, market size did not appear to be a critical factor in affecting industrial diversification at this time—the relative share of Arab world population is only marginally significant in contributing to the separation of country groupings.
5. As might be expected the Group I countries had relatively large ratios of government expenditures to absorption. However, this factor does not facilitate understanding of the industrial structures in the Middle East at this time.

By 1980 (See Table 5):

1. The delineation between groups was essentially the same as in the base year. However, the middle income group was somewhat more sharply defined.
2. A size variable—the relative share of Arab world population had replaced the domestic linkage term as third most important variable in differentiating the three country groupings.

Finally, by 1985 (See Table 6):

1. Delineation between the three groups was still quite sharp, with only one country, Mauritania, misclassified on the analysis based on three variables.
2. The differentiation between Groups II and III was not nearly as sharp as that between I and the other two, nor had it improved significantly over that obtained in the base period.

Table 6
Arab Countries: Industrial Environments, 1985
Probability of correct placement

Country	Seven Variables Group I	Group II	Group III	Three Variables Group I	Group II	Group III
Oil Economies—Group I						
UAE	100.00	0.00	0.00	99.95	0.05	0.00
Bahrain	99.75	0.25	0.00	95.17	4.81	0.02
Saudi Arabia	99.99	0.01	0.00	90.39	9.52	0.10
Oman	100.00	0.00	0.00	99.96	0.04	0.00
Qatar	100.00	0.00	0.00	98.49	1.51	0.00
Kuwait	100.00	0.00	0.00	99.97	0.03	0.00
Libya	na	na	na	86.03	13.89	0.09
Average	**99.96**	**0.04**	**0.00**	**95.71**	**4.26**	**0.03**
Middle Income—Group II						
Iraq	na	na	na	4.36	86.09	9.54
Jordan	0.00	25.69	74.31*	0.13	52.42	47.45
Egypt	0.00	99.78	0.22	0.41	79.77	19.82
Algeria	0.32	99.42	0.26	2.59	89.84	7.58
Tunisia	0.02	99.67	0.31	0.66	83.30	16.04
Morocco	0.00	98.03	1.97	0.05	65.35	34.60
Average	**0.07**	**84.52**	**15.41**	**1.37**	**76.13**	**22.51**
Low Income—Group III						
Yemen AR	0.00	0.03	99.97	0.00	15.37	84.63
Sudan	0.00	1.39	98.61	0.00	30.27	69.73
Somalia	na	na	na	0.00	25.92	74.08
Mauritania	0.01	50.03*	49.96	6.41	81.22*	12.36
Average	**0.05**	**16.42**	**83.53**	**1.60**	**38.22**	**60.20**

Discriminating Variables	F Statistic	Group Means I		II	III
Relative share of Arab world population	1.08	1.46		10.88	5.34
Relative share of Arab world GDP	1.17	6.67		6.36	0.09
Government civilian expenditure/absorption	2.29	0.38		0.34	0.17
Government Military expenditure/absorption	0.33	0.21		0.07	0.05
Absorption/GDP 5.66 0.87		1.13	1.26		
Imports/absorption	3.59	0.47		0.36	0.38
Non-oil GDP/absorption	5.39	0.71		0.79	0.77

3. Domestic linkages had increased in importance and were a close second in aiding in the classification process.
4. While still not a major factor in the differentiating process, government expenditures (civilian) were increasing in statistical importance.

Since the country groupings obtained using the macro-economic variables (Tables 4-6) were, for all practical purposes, the same as those obtained using only variables depicting industrial structure (Tables 1-3), it is tempting to conclude that factors such as absorption/gross domestic product, imports/absorption, domestic linkages and perhaps size have been instrumental in shaping the industrial structures of the region.

For the Gulf states this would suggest that their relatively low levels of expenditures relative to GDP, their high rate of imports and rather low linkages between domestic production (non-oil GDP) and expenditures (absorption) have produced their observed pattern of industrialization characterized by a relatively low level of manufacturing relative to services, distribution and non-oil output; i.e., the general over production of non-tradeable and the under production of tradeable goods.

Before we conclude that this is in fact the case, it is important to note that other factors such as the so-called "Dutch Disease", have also been identified as

biasing the industrialization process in the Gulf states towards non-tradeables.[8] Since, Dutch Disease effects are usually associated with sudden expansions in government expenditures, they should have been captured by the government expenditure terms (Tables 4-6). The increased statistical importance of government civilian expenditures in the classification process may indicate that Dutch Disease effects are finally beginning to retard industrial development in the Gulf states.

Perhaps more importantly, the aggregate analysis carried out above may conceal important differences within groups, thus making any country specific policy conclusions quite tenuous. To overcome this limitation a final set of exercises were undertaken to delineate as much as possible the relative impact of domestic linkage and relative size on the region's industrialization process.

To overcome this limitation, a factor analysis[9] was used to determine the relative importance of domestic linkages and market size in affecting the industrial diversification efforts of the individual Arab countries. In terms of methodology, the following steps were included:

1. Variables were selected to depict the impact of size, domestic linkages and the government involvement in the economy.
2. The size variables were the same as those used in the discriminant analysis - the relative share of Arab world population and income. Domestic linkages to industry were depicted by the ratio of non-oil gdp to absorption. The government's impact on manufacturing was represented by the ratio of government expenditures to non-oil gdp and absorption.
3. Several variables depicting the oil sector were also added to determine the relative impact of hydrocarbons on economic structure.
4. To put the evolution of the manufacturing sector in perspective, variables depicting the distribution and service sectors were added. Each sector was depicted by two variables, the value added in the sector to absorption and to non-oil gdp.
5. The impact of market size and domestic linkages were determined by comparing factor scores computed with these variables in the analysis, and the factor scores obtained when these variables were omitted from the analysis. Put differently, factor scores represent the relative ranking of countries on each of the main dimensions (or environments) in the data set.
6. Factor scores obtained by including size and domestic linkages in analysis represent the relative ranking of countries in industrial development, given an environment in which size and domestic linkages were interacting with manufacturing output to determine that sector's importance in the economy.
7. Factor scores obtained by omitting either size, domestic linkages or both, depict what the ranking of countries in the attainment of industrial diversification in an environment where these elements were not impacting on the development of manufacturing. The differences in factor scores between environments where size and linkages are in the analysis and those obtained without these variables, provide an indication of the relative importance of these phenomena in shaping each country's industrial structure.

The results (Tables 7-9), give some indication of the diversity at work across our three groups, and, perhaps more importantly, within each individual group:

1. The factor analysis (Table 7) for the beginning of the period (1975) produced four main trends in the data: (a) an external dimension represented by oil and oil financed government expenditures, (b) an industrial factor consisting of manufacturing, services/absorption and domestic linkages, (c) a distribution dimension, and (d) a service sector dimension.
2. In general, manufacturing at this point in time had developed somewhat independently of external factors. Instead, its development was controlled more by domestic linkages and to a lesser extent the relative size of the country in terms of population.
3. In contrast, both distribution and service activities showed an inverse relationship to size. While domestic linkages were not important to the development of distribution activities, they appear to have a negative association with services i.e., the greater the ratio of non-oil gdp to absorption, the smaller the contribution made by service activities to the overall economy.
4. In terms of factor scores (fourth column bottom of Table 7), Bahrain had the greatest attainment of industrial diversification at the beginning of the period (in an environment where linkages and size

8. See for example, Looney (1988), Al-Sabah (1988, p. 129-144) and Parvin and Hashem Dezhbakhsh (1988, p. 469-477)..
9. See Rummel (1970) for a general description of factor analysis together with an excellent description of how to interpret results.

Table 7
Arab States: Factors Affecting Industrial Production, 1975
Standard Regression Coefficients

Variable	Oblique Factor Pattern Factor 1 EXTERNAL	Factor 2 MANUFACTURE	Factor 3 DISTRIBUT.	Factor 4 SERVICES
Oil/absorption	0.97	- 0.05	0.13	- 0.01
Oil/GDP	0.94	- 0.21	0.05	0.04
Govt. expenditure/absorption	0.78	0.09	0.06	0.15
Govt. expenditure/GDP	0.73	- 0.14	-0.04	0.30
SIZE, INCOME	0.73	0.19	0.59	- 0.07
Absorption/GDP	-0.91	- 0.11	-0.09	0.17
Manufacturing/absorption	-0.04	0.96	-0.01	0.11
Manufacturing/GDP	0.00	0.93	-0.09	0.17
Services/absorption	0.00	0.76	0.10	0.63
LINKAGES	-0.08	0.68	0.08	- 0.48
Distribution/GDP	0.10	- 0.10	0.83	0.05
Distribution/absorption	0.10	0.45	0.80	- 0.24
SIZE, POPULATION	0.00	0.37	-0.52	- 0.39
Services/GDP	0.05	0.23	-0.02	0.95

	Factor Scores (manufacturing) Size, Pop. Linkages	Incorporating Linkages	Size, Pop.	Neither
Oil Economies—Group I				
UAE	- 0.97(-)	- 1.06(-)	- 1.00(-)	- 0.73
Bahrain	2.29(-)	2.46(-)	2.10(-)	2.52
Saudi Arabia	0.64(-)	0.77(-)	1.07(=)	1.08
Oman	- 1.78(-)	- 1.78(-)	- 1.55(+)	- 1.71
Qatar	0.41(+)	0.38(+)	- 0.16(=)	0.22
Libya	0.77(-)	- 0.67(=)	- 0.56(=)	- 0.62
Middle Income—Group II				
Jordan	- 0.17(=)	- 0.19(=)	- 0.14(=)	- 0.19
Egypt	1.09(+)	0.75(=)	1.36(+)	0.80
Algeria	- 0.01(-)	- 0.11(-)	0.31(+)	0.20
Tunisia	0.35(+)	0.41(=)	0.11(-)	0.21
Morocco	1.20(+)	1.16(=)	1.24(+)	1.12
Low Income—Group III				
PDR Yemen	- 0.48(=)	- 0.45(=)	- 0.47(=)	- 0.45
Yemen AR	- 0.66(=)	- 0.67(=)	- 0.78(-)	- 0.67
Sudan	0.20(+)	0.07(+)	0.02(=)	- 0.01
Somalia	- 0.69(=)	- 0.56(+)	- 0.93(-)	- 0.72
Mauritania	- 0.65(-)	- 0.49(+)	- 0.63(=)	- 0.58

Note: ( ) indicates movement in ranking relative to column four factor scores.

were not controlled for i.e., were not included in the factor analysis and hence did not affect the relative factor scores), while Oman was the least diversified.

5. Netting out size, and examining the effects of domestic linkages on industrialization efforts, the considerably lower factor scores (column two relative to column four, bottom Table 7) for the UAE and Saudi Arabia indicate that the lack of integration of industrial output with the demand of other sectors for manufactured goods were constraining industrial diversification of these economies. The reverse appears to be the case for Qatar.
6. In contrast, omitting linkages from the analysis (third column, bottom Table 7), and incorporating only the effect of size on industrial diversification produced significantly lower factor scores for the UAE, Bahrain, and to a lesser extent Oman. In other

Table 8
Arab States: Factors Affecting Industrial Production, 1980
Standard Regression Coefficients

Variable	Oblique Factor Pattern			
	Factor 1 EXTERNAL	Factor 2 MANUFACTURE	Factor 3 SERVICES	Factor 4 DISTRIBUT.
Govt. exenditure/GDP	0.92	- 0.10	- 0.10	- 0.01
SIZE, INCOME	0.91	0.23	- 0.15	- 0.35
Govt. exenditure/absorption	0.89	0.23	- 0.06	0.06
Oil/GDP	0.66	- 0.21	0.33	0.24
oil/absorption	0.59	- 0.12	0.40	0.28
Absorption/GDP	- 0.61	- 0.14	- 0.28	- 0.34
Manufacturing/absorption	- 0.06	0.94	0.10	0.11
absorption/gdp	0.15	0.92	0.08	0.04
LINKAGES	- 0.49	0.61	- 0.03	0.12
Services/GDP	0.16	- 0.09	- 0.96	- 0.22
Services/absorption	- 0.10	0.45	0.91	- 0.12
SIZE,POPULATION	0.29	0.52	- 0.69	- 0.06
Distribution/GDP	0.14	- 0.05	- 0.15	0.97
Distribution/absorption	- 0.16	0.41	- 0.12	0.92

	Factor Scores (manufacturing)			
	Size, Pop. Linkages	Incorporating Linkages	Size, Pop.	Neither
Oil Economies—Group I				
UAE	- 0.63(-)	- 0.48(=)	- 0.62(-)	- 0.44
Bahrain	1.75(-)	2.06(=)	1.69(-)	2.02
Saudi Arabia	0.09(-)	0.11(-)	0.31(=)	0.36
Oman	- 1.83(=)	- 1.93(=)	- 1.78(=)	- 1.89
Qatar	0.10(+)	- 0.11(+)	- 0.16(+)	- 0.45
Kuwait	0.34(=)	0.29(-)	0.45(=)	0.38
Libya	- 1.10(=)	- 1.23(-)	- 1.00(+)	- 1.14
Middle Income—Group II				
Iraq	- 0.33(-)	- 0.37(-)	- 0.23(=)	- 0.24
Jordan	- 0.12(-)	0.11(-)	0.03(-)	0.30
Egypt	1.26(+)	0.86(=)	1.30(+)	0.86
Algeria	0.58(=)	0.56(-)	0.69(=)	0.68
Tunisia	0.64(=)	0.76(+)	0.55(=)	0.66
Morocco	1.75(+)	1.61(=)	1.76(+)	1.59
Low Income—Group III				
Yemen AR	- 1.13(-)	- 1.00(+)	- 1.02(-)	- 0.87
Sudan	0.03(+)	- 0.05(+)	- 0.31(+)	- 0.43
Somali	- 0.73(=)	- 0.48(+)	- 1.00(-)	- 0.72
Mauritania	- 0.68(=)	- 0.71(=)	- 0.64(=)	- 0.69

Note: ( ) indicates movement in ranking relative to column four factor scores.

words, given their relative populations, these countries performed considerably poorer than would have been the case if size did not systematically affect the demand for industrial products.

7. Several general patterns appear in 1975 when the Arab countries are looked at in terms of our three country groupings:

a. With respect to Group 1 countries, lack of strong domestic linkages appears to have systematically constrained that group's industrial diversification efforts. This factor was neutral for Group III countries of industry with non-industrial sectors had proven to be a stimulus to industrial output.

b. Relative size (as proxied by population) had tended to constrain industrial production in Group I countries, facilitate it in Group II countries and had been somewhat neutral in the case of Group III countries.

c. The overall effects of size and domestic linkages appear, with the notable exception of Qatar, to have suppressed the industrial diversification efforts of

Table 9
Arab States: Factors Affecting Industrial Production, 1985
Standard Regression Coefficients

Variable	Oblique Factor Pattern Factor 1 EXTERNAL	Factor 2 MANUFACTURE	Factor 3 DISTRIBUT.	Factor 4 SERVICES
Services/GDP	0.97	0.15	- 0.02	- 0.05
Govt. expenditure/absorption	0.88	0.10	- 0.34	0.00
Services/absorption	0.86	0.54	0.10	- 0.24
Oil/absorption	0.83	- 0.03	0.38	0.00
Govt. expenditure/GDP	0.82	- 0.24	- 0.24	0.18
Oil/GDP	0.77	- 0.26	0.41	0.10
Manufacturing/absorption	0.08	0.97	0.08	0.25
LINKAGES	- 0.10	0.84	- 0.05	- 0.27
Manufacturing/GDP	0.15	0.78	0.15	0.51
Distribution/GDP	0.01	- 0.04	0.96	- 0.02
Distribution/absorption	- 0.12	0.48	0.74	- 0.17
SIZE, GDP	0.13	- 0.01	- 0.07	0.88
SIZE, POPULATION	- 0.43	0.38	- 0.12	0.67

	Factor Scores (manufacturing) Size, Pop. Linkages	Incorporating Linkages	Size, Pop.	Neither
Oil Economies—Group I				
UAE	0.44(-)	0.79(=)	0.64(-)	0.84
Bahrain	0.92(=)	0.87(=)	0.83(-)	0.91
Saudi Arabia	- 0.92(-)	- 0.46(=)	- 0.54(-)	- 0.44
Oman	- 1.66(=)	- 1.67(=)	- 1.74(=)	- 1.71
Qatar	1.21(+)	0.94(=)	0.97(+)	0.83
Kuwait	- 1.32(-)	- 1.13(-)	- 0.79	- 0.79
Libya	na	na	na	na
Middle Income—Group II				
Iraq	na	na	na	na
Jordan	- 0.19(-)	- 0.19(-)	- 0.05(=)	0.01
Egypt	0.62(=)	0.66(=)	0.83(+)	0.64
Algeria	0.22(=)	0.44(+)	0.22(=)	0.27
Tunisia	0.56(=)	0.52(=)	0.46(=)	0.49
Morocco	1.56(-)	1.55(-)	1.74(=)	1.69
Low Income—Group III				
PDR Yemen	na	na	na	n a
Yemen AR	- 0.72(+)	- 0.97(=)	- 1.00(=)	- 1.03
Sudan	0.41(+)	0.10(+)	- 0.17(=)	- 0.23
Mauritania	- 1.24(+)	- 1.46(=)	- 1.51(=)	- 1.50

Note: ( ) indicates movement in ranking relative to column four factor scores.

the Group I countries. Group II countries had benefitted considerably from these effects, while Group III countries had, with the possible exception of Sudan, experienced no effects from these factors.

By 1980 the picture (Table 8) had changed to the extent that:

1. While still experiencing difficulties integrating their industrial structures with the domestic economy (second column, bottom Table 8), the Group I countries appeared, as a whole to have improved their record relative to 1975.
2. However, the limitations imposed by market size continued to limit Bahrain and the UAE's industrial diversification efforts.
3. Overall the net effects of size and domestic linkages continued (column one, bottom of Table 8) to suppress industrialization in the Group I countries.
4. Despite high investment rates over the 1975-80 period financed by oil revenues, several of the more important Group I countries—Saudi Arabia, Bah-

rain had significant declines (column 4 bottom of Table 8 v column 4 bottom of Table 7) in their relative standing on the scale of Arab world industrial diversification.

5. Only the UAE had any real success in increasing the share of manufacturing in non-oil dgp and absorption.
6. Each of the Group II countries made considerable progress in overcoming the limitations imposed by size and domestic linkages, with Egypt, Algeria, Tunisia and Morocco leading the way. In most cases, these gains were fairly evenly distributed between linkage and size factors.
7. As might be anticipated, the Group III countries fell further behind in their relative degree of industrialization.

Finally, by 1985 (Table 9):

1. With the exception of Qatar, most of the Group I countries were still experiencing constraints to industrialization brought on by their small size and relative lack of domestic linkages. The UAE made the greatest progress over the 1975-85 period in overcoming these limitations, followed by Qatar.
2. For the Group I countries, size (with the exception of Kuwait and perhaps Qatar) posed a greater hindrance to further industrial diversification than that posed by the relative lack of domestic linkages to industry.
3. The relative decline of Bahrain and Saudi Arabia is clearly related to the overexpansion of the service and distribution sectors in these countries, rather than any marked lag in industrial output. Still, the fall in their relative ranking in terms of industrialization in the Arab world is discouraging, as is Kuwait's decline between 1980 and 1985.
4. All of the Group II countries with the exception of Egypt improved their ranking on the scale of industrial diversification over the 1975-88 period, while the Group III countries continued to fall further behind.

Observations on Gulf Industrialization

Over time, the shocks set off by the 1973/74 oil price increases have created three somewhat unique environments, each of which has tended to shape the industrial structures of its member countries in a predictable manner.

The net result has been the almost complete differentiation of the Arab world into three distinct types of economies, each of which can be characterized by an industrial structure unique to the members of that group.

As identified here, the oil economies have over expanded their service and distribution sectors relative to industry. While the UAE and Qatar have been relatively bright spots, the small size of these countries and their lack of domestic integration have put severe limitations on further industrialization. This fact has been made even more apparent by the post-1982 fall in oil revenues, and the resulting inability of these governments to provide a continued high level of subsidies to industry.

All and all, the results of this process were the creation of an industrial sector with the following characteristics.[10]

1. The variation between the level of infrastructural development achieved and the incentives provided an any given state has created an imbalance whereby some states have become centres for industry at the expense of others. The states which have developed an industrial infrastructure more quickly have attracted the skilled labour and the economic activity have attracted the skilled labour and the economic activity required, while other areas have been relatively depopulated and starved of investment. This phenomenon on an inter-state basis is even more apparent on a regional basis within a given state. Unbalanced economic development prevents maximum exploitation of the region's natural resources.
2. The industrial development process is heavily dependent on transient migrant labour. In 1975 the percentage of foreign labour in the economically active population in Kuwait reached 80 per cent while the foreign element was even higher in Qatar and the UAE. The failure to produce an indigenous workforce can be attributed to several factors the most important of which are:

a The arbitrary distribution of revenues from production without any direct relationship between income and productivity of the beneficiaries of the distribution.

b. The limitations of educational curricula and the inability of the duration system to promote the concept and principle of productivity with the result that the young Gulf citizen seeks to create an identity through conspicuous consumption rather than through conspicuous consumption rather than through the creation or accumulation of wealth.

c Social traditions and legal complications which ob-

10 See Abdulla Hamad Al-Moajil (1986) pp. 17-18).

struct participation of women economic activities, thus further reducing the limited availability of manpower.

d The cost trap into which Gulf industries fell in the first states of development and from which they can only escape through carefully planned controls and policies.

The cost trap is a result of bad management, lack of supervision to prevent waste, and most important of all, a direct consequence of corruption at management level.

Conclusions

The results obtained above are suggestive of the need for a joint industrial strategy in the Gulf. While the articulation of such a strategy is beyond the scope of the present study, is clear that any endeavour along these lines must begin with increased efforts at economic integration through the Gulf cooperation council. Such a strategy has become vitally necessary if these countries want to make the transition from consumer-oriented societies, dependent for the maintenance for their high standard of living on the constant exchange of depleting oil reserves for consumer goods, to production based societies less dependent on external factors and less constrained by internal limitation for the maintenance of their standards of living (Abdulla Hamad Al-Moajil (1986) p.23).

REFERENCES

Mohammad Al-Sabah (1988), "The Dutch Disease in an Oil-Exporting Country: Kuwait", *OPEC Review* (Summer), pp. 129-44,Arab Monetary Fund (1980), *Joint Arab Economic Report* Abu Dhabi: Arab Monetary Fund.

Arab Monetary Fund (1987), *National Income Accounts of Member Countries, 1974-85*, Abu Dhabi: The Arab Monetary Fund.

Arab Banking Corporation (1986), *Industrialization in the Arab World* , Manama, Bahrain, Arab Banking Corporation, pp 12-15.

El-Imam, (1986), "Decline of Oil Revenues," in Abdel Majid Farid and Hussein Sirriyeh, eds., *The Decline of Arab Oil Revenues* , Beckenham, Kent: Croom Helm, pp. 1-5.

Abdulla Hamad al-Moajil (1986), "Industrialization in the Arab Gulf States: Notes on a Development Process", *Arab Gulf Industry* (January), pp. 9-30.

Randall Jones (1980), "A Model for Predicting Expropriation in Latin America", *Columbia Journal of World Business* (Spring), pp. 74-80.

James Klett (1972), *Applied Multivariate Analysis,* New York: McGraw-Hill.

Robert E. Looney and Craig Knouse (1987), "Profiles of Third World Mineral Producers, *Resources Policy,* (March), pp. 55-67

Robert E. Looney (1987), "Macroeconomics Impacts of Third World Mineral Production, *Manchester Papers on Development* (March), pp. 1-23.

Robert E. Looney (1988), "Oil Revenues and Viable Development: Impact of the Dutch Disease on Saudi Arabian Diversification Efforts", *American Arab Affairs* (Winter).

Manoucher Parvin and Hashem Dezhbakhsh (1988), "Trade Technology Transfer, and Hyper-Dutch Disease in OPEC: Theory and Evidence", *International Journal of Middle East Studies* (November), pp. 469-477.

R.J. Rummel (1970), *Applied Factor Analysis* , Evanston Illinois: Northwestern University Press.

Sas User's Guide (1985), *Statistics, Version 5 Edition* Cary, North Carolina: SAS Institute,

Yusif Sayigh (1978), *The Determinants of Arab Economic Development* , New York: St. Martin's Press.